



# Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Name of Program: B.Sc.

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment <sup>a</sup>	END SEM University Exam	Teachers Assessment <sup>a</sup>				
ML 301	ODS	ENVIRONMENT AND ENERGY STUDIES	60	20	20	0	0	4	0	0	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit.

\*Teacher Assessment shall be based following components: Quiz/Assignment/Project/ Participation in Class, given that no component shall exceed more than 10 marks.

## Course Educational Objectives (CEOs):

1. To understand sources of information required for addressing environmental challenges
2. To identify a suite of contemporary tools and techniques in environmental informatics
3. To apply literacy, numeracy and critical thinking skills to environmental problem-solving

## Course Outcomes (COs):

Students will be able:

1. To apply the principles of ecology and environmental issues that apply to air, land and water issues on a global scale.
2. To develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
3. To demonstrate ecology knowledge of a complex relationship between predators, prey, and the plant community.

## Course Contents:

### Unit I

**Environmental Pollution and Control Technologies:** Environmental Pollution & Control: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and industrial pollution, Ambient air quality standards. Water pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid Waste management composition and characteristics of e - Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, Secondary and Tertiary.

### Unit II

**Natural Resources:** Classification of Resources: Living and Non - Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problem, Mineral resources: use and exploitation, environmental effects of extracting and using

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mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable energy source, case studies.,

### Unit III

**Ecosystems:** Definition, Scope and Importance ecosystem, Classification, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Energy flow in the ecosystem, Biogeochemical cycles, Bioaccumulation, ecosystem value, devices and carrying capacity, Field visits.

### Unit IV

**Biodiversity and its Conservation:** Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels. - . India as a megadiversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man/wildlife conflicts; Conservation of biodiversity: In-situ and Ex-situ conservation. National biodiversity act.

### Unit V

**Environmental Policy, Legislation & EIA:** Environmental Protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan(EMP)

### References:

1. Agarwal, K.C.(latest edition).Environmental Biology, Bikaner :Nidi Pub. Ltd.,
2. Brunner R.C.(latest edition) Hazardous Waste Incineration, McGraw Hill Inc.
3. Clank R.S. ,(latest edition. Marine Pollution, Clanderson Press Oxford (TB).
4. Environmental Encyclopedia, Jaico Pub. Mumbai,
5. De A.K(latest edition) Environmental Chemistry, Wiley Western Ltd.
6. FrachBharucha(2005).Environmental Studies for Undergraduate Courses by for University Grants Commission.
7. R. Rajagopalan(2006).Environmental Studies. Oxford University Press.
8. M. AnjiReddy(2006).Textbook of Environmental Sciences and Technology. BS Publication.
9. Richard T. Wright(2008).Enviromental Science: towards a sustainable future PHL Learning Private Ltd. New Delhi.
10. Gilbert M. Masters and Wendell P. Ela .(2008).Environmental Engineering and science. PHI Learning Pvt Ltd.
11. Daniel B. Botkin& Edwards A. Keller(2008).Environmental Science Wiley INDIA edition.
12. AnubhaKaushik(2009).EnviromentalStudies. New age international publishers.





Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

B.Sc. (Life Science / Biotechnology / Chemistry)

**BSLS 302: Morphology, Physiology and Developmental Biology of Angiosperms**

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSLS 302	DC	Morphology, Physiology and Developmental Biology of Angiosperms	60	20	20	10	20	4	1	2	7

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

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**Course Objectives:**

1. To study the morphology and physiology of higher plants
2. To study the stages of development in higher plants

**Course Outcomes:**

1. Student will be able to understand the structural and functional aspects of higher plants
2. Student will be able to understand the various stages of development in higher plants

**Unit-I**

The Root system: Root apex and Anatomy of root in monocotyledons and dicotyledons.  
The Shoot system: Shoot apex and Anatomy of shoot in monocotyledons and dicotyledons.  
Phyllotaxy and Anatomy of leaf in monocotyledons and dicotyledons.


**Unit-II**

Morphology of flower. Microsporogenesis and Megasporogenesis,  
Pollination and Fertilization.  
Development of embryo and endosperm in dicotyledons and monocotyledons.

**Unit-III**

Properties of water, water potential, absorption and transport. Transpiration and mechanism of stomata. Soil-plant-atmosphere continuum.  
Drought, heat stress, salinity stress and chilling.

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**Unit-IV**

Photosynthesis: pigments, antenna and reaction centers. Primary light reactions, electron transport chain and phosphorylation. Calvin cycle and carbon fixation in C<sub>3</sub>, C<sub>4</sub> and CAM plants.

Respiration: Glycolysis, TCA cycle and oxidative phosphorylation in Mitochondria.

**Unit-V**

Plant growth and photomorphogenesis. Phytochrome structure and function. Photoperiodism. Physiology of flowering and vernalization.

Plant movements, autonomic and Paratonic movements.


**BSLSL305 Practical:**

- 1) Histological study of roots of Monocots and Dicots
- 2) Histological study of Monocot and dicot stem
- 3) Morphology of monocot and dicot leaves
- 4) Floral organs, floral formula and floral diagram
- 5) Morphology of pollen grains
- 6) Morphology of ovary and placenta
- 7) Parts of Seed, embryo and endosperm
- 8) Plasmolysis and de-plasmolysis
- 9) Differential permeability
- 10) Isolation and absorption spectra of chlorophyll and carotenoids
- 11) Separation of chlorophyll and carotenoids by paper chromatography
- 12) Isolation of chloroplasts and demonstration of Hill activity
- 13) Scotomorphogenesis and photomorphogenesis
- 14) Gravitropic and phototropic movement

**Books:**

1. Embryology of Angiosperms- Bhojwani, S.S. and Bhatnagar, S.P.
2. An Introduction to Embryology of Angiosperms- Maheshwari, P., McGraw Hill Inc., N.Y.
3. Anatomy- Singh V., Pandey P.C. and Jain, D.K.
4. Modern Plant Physiology- Sinha, R.K. Narosa Publishing House.
5. Textbook of Plant Physiology - Verma V., Ane books Publishers.
6. An Introduction to Plant Anatomy-B.P. Pandey, S.Chand Publications.

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SEMESTER III (B.Sc.)

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSCH 304	DC	Inorganic Chemistry I	60	20	20	30	20	3	1	4	6

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; Q/A - Quiz/Assignment/Attendance

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;  
Q/A - Quiz/Assignment/Attendance, MST Mid Sem Test.

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Unit - I

I. Atomic Structure:

Idea of de-Broglie matter waves, Heisenberg uncertainty principle, atomic orbitals, Schrödinger wave equation, significance of  $\psi$  and  $\psi^2$ , quantum numbers, radial and angular wave functions and probability distribution curves, shapes of s, p, d, orbitals, Aufbau and Pauli exclusion principles, Hund's multiplicity rule, Electronic configurations of the elements, effective nuclear charge.

II. Periodic Properties:

Detailed discussion of the following properties with examples

- Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table.
- Atomic radii (van der Waals)
- Ionic and crystal radii.

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- (d) Covalent radii (octahedral and tetrahedral)
- (e) Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy.
- (f) Electron gain enthalpy, trends of electron gain enthalpy.
- (g) Electronegativity.

## Unit-2

### Chemical Bonding:

(A) Covalent Bond – Valence bond theory and its limitations, directional characteristics of covalent bond, various types of hybridization and shapes of simple inorganic molecules and ions, valence shell electron pair repulsion (VSEPR) theory to  $\text{NH}_3$ ,  $\text{SF}_4$ ,  $\text{ICl}_2^-$  and  $\text{H}_2\text{O}$ , MO theory, homonuclear and heteronuclear (CO and NO) diatomic molecules, bond strength and bond energy, percentage ionic character from dipole moment and electro-negativity difference.

(B) Ionic Solids – Ionic structures, radius ratio effect and coordination number, limitation of radius ratio rule, lattice defects, lattice energy and polarizing power and polarisability of ions, Fajan's rule.

(C) Weak Interactions – Hydrogen bonding, Vander Waals forces.

## Unit- 3

### Chemistry of *s* and *p* block elements:

Inert pair effect, Relative stability of different oxidation states, diagonal relationship and anomalous behaviour of first member of each group. Allotropy and catenation.

Hydrides and their classification ionic, covalent and interstitial.

Study of the following compounds with emphasis on structure, bonding, preparation, properties and uses.

Boric acid and borates, boron nitrides, borohydrides (diborane) carboranes, silanes, Oxides and oxoacids of nitrogen, Phosphorus and chlorine. Peroxo acids of sulphur, interhalogen compounds pseudohalogens and basic properties of halogens.

#### UNIT-4

##### Coordination Compounds

Werner's coordination theory and its experimental verification, effective atomic number concept, chelates, nomenclature of coordination compounds, isomerism in coordination compounds, valence bond theory of transition metal complexes.

#### UNIT-5

##### Hard and Soft Acids and Bases (HSAB)

Classification of acids and bases as hard and soft, Pearson's HSAB concept, acid base strength and hardness and softness, Symbiosis, theoretical basis of hardness and softness, electro negativity and hardness and softness.

##### Recommended Texts:

1. Huheey, J.E. *Inorganic Chemistry*, Prentice Hall
2. Douglas, B.E. and Mc Daniel, D.H., *Concepts & Models of Inorganic Chemistry*, Oxford
3. Lee, J.D. *Concise Inorganic Chemistry*, ELBS
4. Shriver & Atkins, *Inorganic Chemistry*, Third Edition, Oxford Press
5. H.W. Porterfield, *Inorganic Chemistry*, Second Edition, Academic Press,
6. Canham, G.R. and Overton, T., *Descriptive Inorganic Chemistry*, Freeman & Co
7. Cotton, F.A. and Wilkinson, G., *Advanced Inorganic Chemistry*, Wiley, VCH.
8. Lippard, S.J. & Berg, J.M. *Principles of Bioinorganic Chemistry* Panima Publishing Company

##### Guidelines for Practical:

A two credit lab is to be conducted by covering the most relevant and useful topics from mentioned syllabus.

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## Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

### B.Sc. (Life Science / Biotechnology / Chemistry)

#### BSBT 303: Metabolism and Genetic Engineering

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BSBT 303	DC	Metabolism and Genetic Engineering	60	20	20	30	20	4	1	2	7

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#### Course Objectives:

1. To understand the biochemistry of primary and secondary metabolism
2. To understand the principles of genetic engineering

#### Course Outcomes:

1. Student will have the knowledge of synthesis and degradation of biomolecules
2. Students will be able to understand the application part of molecular biology

#### Unit - I

Carbohydrate metabolism - aerobic and anaerobic glycolysis, Gluconeogenesis, Pentose phosphate pathway.

Lipid metabolism - synthesis and degradation of fatty acids.

#### Unit - II

Nitrogen metabolism: Biological nitrogen fixation, Nitrate reduction and its regulation, Ammonia assimilation.

Biosynthesis of amino acids. Oxidation of amino acids and production of urea.

#### Unit III

Protein synthesis. Protein targeting and degradation.

Biosynthesis and degradation of nucleotides.

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